

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
28 October 2004 (28.10.2004)

PCT

(10) International Publication Number
WO 2004/092768 A3

(51) International Patent Classification⁷: **G01N 23/00**,
23/201, 23/04, G01B 15/02, A61B 6/04, G21K 1/02, 1/00

(21) International Application Number:
PCT/US2004/011153

(22) International Filing Date: 12 April 2004 (12.04.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/412,736 11 April 2003 (11.04.2003) US
10/412,723 11 April 2003 (11.04.2003) US
10/412,751 11 April 2003 (11.04.2003) US

(71) Applicant (for all designated States except US): **FIS-
CHER IMAGING CORPORATION** [US/US]; 12300
North Grant Street, Denver, CO 80241 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **TESIC, Mike**
[US/US]; 2545 Briarwood Drive, Boulder, CO 80305
(US). **BESSON, Guy, M.** [FR/US]; 1672 Emerald Street,
Broomfield, CO 80020 (US). **NIELDS, Morgan, W.**
[US/US]; #4 Sunrise Drive, Englewood, CO 80110 (US).

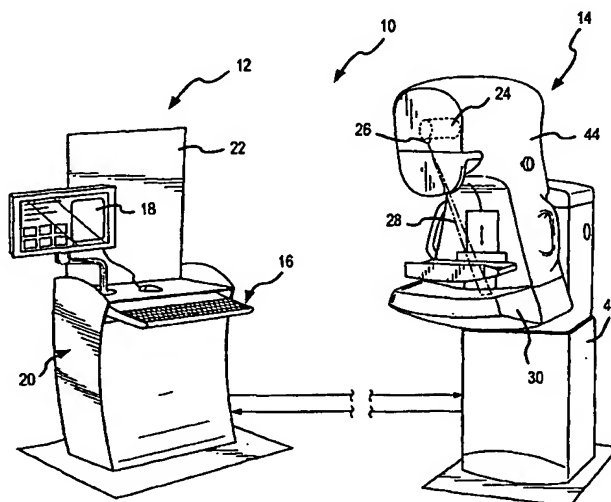
(74) Agent: **MARSH, Thomas, R.**; Marsh Fischmann & Brey-
fogle LLP, 3151 South Vaughn Way, Suite 411, Aurora, CO
80014 (US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,
PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM,
TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,
ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),
Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), Euro-
pean (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR,
GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: SCATTER REJECTION FOR COMPOSITE MEDICAL IMAGING SYSTEMS



(57) Abstract: Scatter effects are reduced in a radiographic imaging device, such as a digital slot scan mammographic imaging device, by reducing detected scatter and processing detector information to compensate for scatter effects. In one embodiment, a digital mammographic imaging system (10) includes a source (24) for transmitting a narrow beam (28) and a detector assembly (32) for detecting the beam (28). The beam (28) and the detector assembly (32) are synchronously scanned across the patient's breast (48) to obtain an image. Collimator slats (74) are provided at the leading and trailing edges of the detector to reduce detected scatter. Additionally, attenuators (76 and 92) are provided at the ends of the scanned motion and at the anterior edge of the detector array to assist in determining a spatial intensity profile. The spatial intensity profile information together with other imaging signal and patient dependent parameters are used in image processing to estimate and compensate for various scatter effects including single and multiple scatters and Compton and Rayleigh scatter.

WO 2004/092768 A3



Published:

— with international search report

(88) Date of publication of the international search report:

2 June 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/11153

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G01N 23/00, 23/201, 23/04; G01B 15/02; A61B 6/04; G21K 1/02, 1/00
US CL : 378/7, 37, 86, 87, 88, 89, 62, 147 and 154

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 378/7, 37, 86, 87, 88, 89, 62, 147 and 154

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,418,832 A (BARNES) 23 May 1995 (23.05.1995), column 3, lines 29-43; column 4, lines 57-62 and column 5, lines 12-25; Figs. 2 and 3.	36-53 and 55
Y	US 5,526,394 A (SICZEK et al) 11 June 1996 (11.06.1996) column 5, lines 35-42; column 6, line 50 - column 7, line 6.	72-75
Y	US 4,998,270 (SCHEID et al) 5 May 1991 (05.05.1991) column 2, lines 20-45)	72-75
A	US 6,618,466 B1 (NING) 9 September 2003 (09.09.2003)	1-35, 54 and 56-71
A	US 6,748,047 B2 (GONZALEZ TROTTER et al) 8 June 2004 (06.08.2004)	1-35, 54 and 56-71
A	US 5,428,657 A (PAPANICOLOPOULOS et al) 27 June 1995 (27.06.1995)	1-35, 54 and 56-71
A	US 6,104,777 A (DARBOUX et al) 15 August 2000 (15.08.2000)	1-35, 54 and 56-71

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

09 February 2005 (09.02.2005)

Date of mailing of the international search report

16 MAR 2005

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Facsimile No. (703) 305-3230

Authorized officer

Irakli Kiknadze

Telephone No. 571-272-2493

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US04/11153

Continuation of B. FIELDS SEARCHED Item 3:

EAST

search terms: scatter compensating, scatter analysis